WHAT IS CLAIMED IS:

1. An implantable medical device for treating a section of a patient's vessel having a vessel branch, a relatively healthy first vessel portion on a first side of the vessel branch, and a diseased vessel portion on a second side of the vessel branch, including:

a fixation section comprising a plurality of filaments which are helically wound in a braided configuration to form a tubular, radially compressible and self-expandable structure, for engaging the first vessel portion on the first side of the vessel branch when in an expanded state to provide substantial anchoring support for the implanted medical device;

a diseased section comprising a plurality of filaments which are helically wound in a braided configuration to form a tubular, radially compressible and self-expandable structure, for engaging a portion of the vessel on the second side of the vessel branch and extending across and treating the diseased vessel portion; and

a branch section comprising a radially compressible and expandable structure, for extending across the vessel branch and connecting the diseased section to the fixation section while allowing blood flow to the vessel branch.

2. The implantable medical device of claim 1 wherein the branch section includes a plurality of filaments extending between the fixation section and the diseased section.

3. The implantable medical device of claim 2 wherein the branch section filaments are generally parallel to one another and have opposite ends wrapped around the filaments of the fixation section and the diseased section.

4. The implantable medical device of claim 2 wherein the filaments of the branch section are helically wound in a braided configuration to form a tubular, radially compressible and self-expandable structure.

5. The implantable medical device of claim 4 wherein a free state diameter of the fixation section is equal to a free state diameter of the branch section.

6. The implantable medical device of claim 4 wherein a radial pressure of the fixation section is greater than a radial pressure of the branch section.

7. The implantable medical device of claim 6 wherein the radial pressure of the fixation section is greater than a radial pressure of the diseased section.

8. The implantable medical device of claim 4 wherein a density of the filaments in the branch section is less than a density of the filaments in the fixation section.

9. A method for manufacturing the medical device of claim 8, including:

helically winding filaments to form a tubular fixation section and a tubular branch section having the same density of filaments; and

removing some of the filaments from the branch section.

10. The method of claim 9 wherein helically winding filaments includes forming a tubular fixation section and a tubular branch section having the same free state diameter.

11. The method of claim 9 and further including:

helically winding filaments to form a fixation section, branch section and diseased section having the same density of filaments; and

removing some of the filaments from the branch section.

12. The method of claim 11 wherein helically winding filaments includes forming a tubular fixation section, branch section and diseased section having the same free state diameter.

13. A method for manufacturing the medical device of claim 8, including:

helically winding filaments at a first braid angle to form the tubular structure of the fixation section; and

helically winding the filaments at a second braid angle which is less than the first braid angle to form the tubular structure of the branch section.

14. The method of claim 13 wherein helically winding filaments includes forming a tubular fixation section and tubular branch section having the same free state diameter.

15. The method of claim 13 and further including:

helically winding filaments at a third braid angle which is greater than the second braid angle to form the tubular structure of the diseased section.

16. The method of claim 15 wherein helically winding filaments includes forming a tubular fixation section, tubular branch section and tubular diseased section having the same free state diameter.

17. The implantable medical device of claim 8 wherein the density of the filaments in the branch section is less than a density of the filaments in the diseased section.

18. The implantable medical device of claim 8 wherein the density of the filaments in the branch section is equal to a density of the filaments in the diseased section.

19. A method for implanting the medical device of claim 1 in a diseased vessel, including:

providing the device in a radially compressed state;

delivering the device to the diseased vessel and positioning the fixation section within the healthy first vessel portion, the branch section within the vessel branch, and the diseased section within the diseased vessel portion; and

causing the device to radially self-expand with the fixation section engaging the first vessel portion, the branch section extending cross the vessel branch, and the diseased section extending across and engaging the diseased portion.

20. An implantable stent-graft for treating a section of a patient's vessel having a vessel branch, a relatively healthy first vessel portion on a first side of the vessel branch, and a diseased vessel portion on a second side of the vessel branch; including:

a fixation section comprising a plurality of filaments which are helically wound in a braided configuration to form a tubular, radially compressible and self-expandable structure, for engaging the first vessel portion on the first side of the vessel branch when in an expanded state to provide substantial anchoring support for the implanted medical device;

a diseased section comprising:

a plurality of filaments which are helically wound in a braided configuration to form a tubular, radially compressible and self-expandable support structure, for engaging a portion of the vessel on the second side of the vessel branch and extending across and treating the diseased vessel portion; and

a radially-expandable membrane coextensive with at least a portion of the length of the support structure; and

a branch section comprising a radially compressible and expandable structure, for extending across the vessel branch and connecting the diseased section to the fixation section while allowing blood flow to the vessel branch.

21. The stent-graft of claim 20 wherein the membrane is coextensive with at least 75% of a continuous length of the diseased section.

22. The stent-graft of claim 20 wherein the membrane is formed of braided filaments.

23. The stent-graft of claim 22 wherein the membrane is formed of braided polymeric filaments.

24. The stent-graft of claim 22 wherein the membrane is formed of filaments interbraided with one another and the filaments of the support structure.

25. The stent-graft of claim 20 wherein the branch section includes a plurality of filaments extending between the fixation section and the diseased section.

26. The stent-graft of claim 25 wherein the branch section filaments are generally parallel to one another and have opposite ends wrapped around the filaments of the fixation section and the diseased section.

27. The stent-graft of claim 25 wherein the filaments of the branch section are helically wound in a braided configuration to form a tubular, radially compressible and self-expandable structure.

28. The stent-graft of claim 27 wherein a free state diameter of the fixation section is equal to a free state diameter of the branch section.

29. The stent-graft of claim 27 wherein a radial pressure of the fixation section is greater than a radial pressure of the branch section.

30. The stent-graft of claim 29 wherein the radial pressure of the fixation section is greater than a radial pressure of the diseased section.

31. The stent-graft of claim 27 wherein a density of the filaments in the branch section is less than a density of the filaments in the fixation section.

32. A method for manufacturing the stent-graft of claim 31, including:

helically winding and braiding filaments to form a tubular fixation section and a tubular branch section having the same density of filaments; and

removing some of the filaments from the branch section.

33. The method of claim 32 wherein helically winding and braiding filaments includes forming a tubular fixation section and a tubular branch section having the same free state diameter.

34. The method of claim 32 and further including:

helically winding and braiding filaments to form a fixation section, branch section and diseased section having the same density of filaments; and

removing some of the filaments from the branch section.

35. The method of claim 34 wherein helically winding and braiding filaments includes forming a tubular fixation section, branch section and diseased section having the same free state diameter.

36. A method for manufacturing the stent-graft of claim 31, including:

helically winding and braiding filaments at a first braid angle to form the tubular structure of the fixation section; and

helically winding and braiding the filaments at second braid angle which is less than the first braid angle to form the tubular structure of the branch section.

37. The method of claim 36 wherein helically winding and braiding filaments includes forming a tubular fixation section and tubular branch section having the same free state diameter.

38. The method of claim 36 and further including:

helically winding and braiding filaments at a third braid angle which is greater than the second braid angle to form the tubular structure of the diseased section.

39. The method of claim 38 wherein helically winding and braiding filaments includes forming a tubular fixation section, tubular branch section and tubular diseased section having the same free state diameter.

40. The stent-graft of claim 31 wherein the density of the filaments in the branch section is less than a density of the filaments in the diseased section.

41. The stent-graft of claim 31 wherein the density of the filaments in the branch section is equal to a density of the filaments in the diseased section.

42. A method for implanting the stent-graft of claim 20, including:

providing the device in a radially compressed state;

delivering the device to the diseased vessel and positioning the fixation section within the healthy first vessel portion; the branch section within the vessel branch, and the diseased aorta section within the diseased portion; and

causing the device to radially self-expand with the fixation section engaging the first vessel portion, the branch section extending cross the vessel branch, and the diseased section extending across and engaging the diseased vessel portion.

43. An implantable medical device for treating a portion of a patient's vessel having a branch, a first portion on a first side of the branch, and a second portion on a second side of the branch, including:

a first section having a first porosity and comprising a plurality filaments which are helically wound in a braided configuration to form a tubular, radially compressible and self-expandable structure, for engaging the first portion of the vessel on the first side of the branch;

a second section having a second porosity and comprising a plurality filaments which are helically wound in a braided configuration to form a tubular, radially compressible and self-expandable structure, for engaging the second portion of the vessel on the second side of the branch; and

a branch section having a third porosity which is less than at least one of the first and second porosities and comprising a radially compressible and expandable structure, for extending across the branch and connecting the first and second sections while allowing blood flow to the branch.

44. The implantable medical device of claim 43 wherein the filaments of the branch section are helically wound in a braided configuration to form a tubular, radially compressible and self-expandable structure.

45. The implantable medical device of claim 44 wherein free state diameters of the first section, second section and branch section are equal to one another.

46. The implantable medical device of claim 44 wherein the second section includes a radially-expandable and relatively low porosity membrane coextensive with at least a portion of the length of the self-expandable structure.

47. The implantable medical device of claim 46 wherein the second section membrane is formed of braided filaments.

48. The implantable medical device of claim 47 wherein the second section membrane is formed of filaments interbraided with one another and the filaments of the self-expandable structure.

49. The implantable medical device of claim 46 wherein the first section includes a radially-expandable and relatively low porosity membrane coextensive with at least a portion of the length of the self-expandable structure.

50. The implantable medical device of claim 49 wherein the first section membrane is formed of braided filaments.

51. The implantable medical device of claim 50 wherein the first section membrane is formed of filaments braided with one another and the filaments of the self-expandable structure.